

NATURAL RESOURCES ISSUES

Threats to Natural Resources

There are a number of threats and issues related to natural resources at Channel Island. Many of these issues are interrelated (for example: "Degradation of park resources due to non-native animals" causes "Impacts on threatened, endangered, and other sensitive plants" and "Loss of biological diversity") The primary issues are:

- NO2 Impacts on Threatened, Endangered, and Other Sensitive Animals
- NO3 Impacts on Threatened, Endangered, and Other Sensitive Plants
- NO4 Degradation of Park Resources Due to Non-Native Animals
- NO5 Degradation of Park Resources Due to Non-Native Plants
- NO6 Disruption of Native Plant Communities and Accelerated Erosion Due to Past Land Practices
- NO7 Disruption of Natural Fire Regimes
- N10 Disruption of Park Resources Due to Mineral Extraction & Geothermal Activities
- N12 Alternation of Natural Flow Regimes
- N14 Visibility Impairment and Biological Damage Caused by Air Pollution (Includes Wet and Dry Deposition)
- N15 Noise, Visual, and Biological Impacts Related to Aircraft Overflights
- N17 Loss of Biological Diversity
- N18 Visitor Use Impacts on Backcountry Park Resources
- N19 Loss of Park Resources Due to Consumptive Practices (Commercial Fishing, Grazing)
- N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them
- N21 Loss of Fragile and Irreplaceable Cave Resources

Following is information detailing the major issues facing Channel Islands National Park, organized by Servicewide Issue.

Impacts on Threatened, Endangered and other Sensitive Animals and Plants

The Endangered Species Act of 1973, as amended, and National Park Service policy require the National Park Service to take

management action to conserve, protect and recover listed, candidate and sensitive species and their habitats. Ecosystem alteration directly related to the land use practices of the past 150 years has caused range reduction and population decline in plants and wildlife species of many types across the northern Channel Islands. This decline is a widespread phenomenon, affecting plants and wildlife species of different types in much the same ways.

The park has determined that a prudent approach to the simultaneous recovery of many species is to manage for recovery of habitat structures and ecosystem processes necessary to reverse the declining trends. The best conservation actions will be those that determine and maintain the environmental conditions supporting island species

The park manages 91 taxa of terrestrial plants and animals (24 animals, 67 plants) that are sensitive, rare, threatened, or endangered (Appendix I or Appendix II). Of these, twenty-eight species have been listed under the Endangered Species Act. The relatively high number of T&E species is due to the isolation of the islands and the intensive human use of the islands. Non-native animals have seriously reduced the populations and distributions of native plants and animals.

A systematic survey and inventory for rare plants and animals has been conducted on Anacapa, Santa Barbara, Santa Rosa and San Miguel Islands, and the TNC portion of Santa Cruz Island. Most of the information generated for these species is comprised of mapped locations, life history, general ecological data, and general population status. Such a survey has yet to be completed on East Santa Cruz Island, although general collecting trips have been made for the purpose of updating flora and fauna lists. Monitoring of rare plants needs to be designed and carried out for all the islands.

For a few species, such as Brown Pelicans (federally listed endangered), and Island Oaks (rare park endemic) more intensive population studies have been conducted to determine population condition; as a result, a determination has been made to shift management emphasis for these species to either the Monitoring Program (California Brown Pelicans) or to the Ecosystem

and Habitat Restoration Program (Island Oaks). For the remaining, and the majority, of the sensitive and rare species, we have little current knowledge of population dynamics. Surveys of Santa Rosa and Santa Cruz Islands need to be completed to finish the general information-gathering process for the entire park.

For most of the 91 sensitive species, population dynamics studies will have to be conducted to ascertain the status of each population on each island to determine whether the populations require only periodic monitoring or if the populations are in such a degraded or precarious condition that active restorative management is needed. Once these determinations are made, on a taxa by taxa basis, the responsibility for that taxa will be transferred either to the park's Monitoring Program or to the Ecosystem and Habitat Restoration Program.

Project statements related to this issue:

N1-03 Design new monitoring protocol for Western Brown Pelicans

N-1-07 Monitor Peregrine Falcons

N-1-08 Monitor listed and rare plants

N-2-01 Determine cause of Snowy Plover population decline on the northern Channel Islands

N-2-02 Monitor ungulate impacts to listed species

N-2-03 Eradicate fennel and poigs from Santa Cruz Island

N-2-04 Eradicate black rats from Anacapa Island

N-2-05 Implement Recovery actions for island foxes

N-2-16 Allow threatened Sea Otters to reinhabit the Channel Islands

Degradation of Park Resources Due to Non-Native Animals and Plants

Exotic animals are a persistent problem at Channel Islands National Park. Research into the ecology and population dynamics of exotics on the Channel Islands has been done for a number of species; Rats (*Rattus rattus*) on Anacapa Island and San Miguel, and Feral Pigs (*Sus scrofa*) from Santa Cruz Island, Past

eradication programs, rabbit (*Oryctolagus cuniculus*) from Santa Barbara Island, Burros (*Equus spp.*) from San Miguel Island, sheep from Santa Cruz Island, and pigs from Santa Rosa Island have been successful. Cattle, managed by former island landowners under a Special Use Permit, were removed from Santa Rosa Island in 1998. Three introduced species (elk, deer, and horses) on Santa Rosa Island are currently being managed under a 5-year special use permit, renewable until 2011. Feral pigs on Santa Cruz Island are largely unmanaged. NPS and TNC have identified eradication of feral pigs from Santa Cruz Island to be of the highest priority.

The park successfully eradicated pigs from Santa Rosa Island. This \$750,000 project is the first we know of in the United States to eradicate pigs from such a large area. The park's monitoring programs are following the recovery of island resources affected by pigs.

The flora of the Channel Islands has been highly altered by the successful invasions of alien species. These aliens, which comprise about 1/4 of all the species cover 2/3 of the land surface. At one extreme are widespread, well-established annual grasses (e.g., *Avena*, *Bromus*, *Hordeum*). At the other extreme are small to expanding populations of potentially invasive weeds and forbs (e.g., *Cirsium ochrocentrum*, *Lavatera cretica*, *Silybum marianum*).

A systematic survey and inventory for alien plants has been conducted on all the park islands. For targeted species, life history, ecological data, and potential control techniques have been researched. Distribution maps for these species have been completed.

Successful restoration of island ecosystems is dependent on removal of the non-native herbivores. It is possible that deer, elk, and horses will remain on Santa Rosa Island until 2011, the final date when the park can permit the prior operations of the former owner to continue. Pigs must be eradicated from Santa Cruz Island. Black Rats on Anacapa and San Miguel are a continuing problem. The park has developed a plan to eradicate rats from Anacapa Island and will be carrying out environmental compliance for this project through FY2000.

The islands are good candidates for eradication, as opposed to "control", because the surrounding waters provide a barrier to an influx

of nonnative animals. A concentrated effort is the most effective way to eradicate a population. Therefore, eradication projects require substantial funds over short periods of time.

Project statements related to this issue:

N-1-15 Study ecology of Spotted Skunks on Santa Rosa Island

N-2-02 Monitor ungulate impacts to listed species

N-2-03 Eradicate fennel and pigs from Santa Cruz Island

N-2-04 Eradicate Black Rats from Anacapa Island

N-2-05 Eradicate Black Rats from San Miguel Island

C-5 Survey archeology of East Santa Cruz

C-21 Design / implement a cultural resource monitoring program

Disruption of Native Plant Communities and Accelerated Erosion Due to Past Land Practices

The Park islands have been surveyed for occurrences of introduced plants and animals and for native plants and animals. This survey led to an understanding that past land use (grazing) caused a serious degradation of the natural ecosystems on lands that would eventually be included in the park. A few facts: all five of the islands in the park were at one time overgrazed, four of the five islands still have introduced herbivores, approximately 25% of the flora of the park is introduced, approximately 65% of the vegetation cover of the islands is made up of introduced species dominated plant communities.

In conjunction with the survey of plants and animals, maps have been developed for plant community locations and for locations of sensitive plant and animal species. Population dynamics studies have been done on some species in order to understand how seriously damaged they are and studies have been done to understand appropriate methods for restoration of damaged areas. Based on the above, initial planning has been done for outlining a restoration program to bring the damaged ecosystems of the park back to a natural condition.

In order to overcome the damage caused by pre-park uses on lands now managed by Channel Islands National Park, a major commitment of funds, supplies, and people will be necessary. While much of the actual labor can be accomplished with volunteers, the need for NPS personnel will be substantial.

Before intensive restoration work can begin on the five islands, support facilities need to be put in place, this includes lodging and transportation, and storage and office space on the mainland. The number of people needed is estimated at 20 full time persons (including administrative and logistical support) plus another 30 part-time, contract and/or volunteer persons. With supplies, nursery areas, heavy equipment, transportation, offices, etc. that will be necessary to accomplish the task, our initial estimate is that it will take approximately \$17 million over a 25 to 30 year period to restore most of the landscape.

Project statements related to this issue:

N-1-09 Survey soils

N-2-02 Monitor ungulate impacts to listed species

N-2-07 Develop strategies to reduce soil erosion and restore soil resources

N-2-10 Restore native plant communities

Disruption of Natural Fire Regimes

The park's Fire Management Plan received final approval in early FY 92. Channel Islands assisted The Nature Conservancy (TNC) in developing and completing the first draft of a Fire Management plan for their 90% of Santa Cruz Island. The Nature Conservancy has established a minimum number of Fire Effects Plots in a stand of Bishop Pines. The Fire Management Plan allows the park and TNC to use fire as a research/resource management tool.

The long-term goal is to understand the effects of fire on the island's ecosystems. Currently, there is insufficient fire history/fire effects data to assess the impacts fire may have on island ecosystems.

There are no project statements related to this issue.

Disruption of Park Resources Due to Mineral Extraction & Geothermal Activities

Channel Islands National Park has considerable exposure to the potential of a major oil spill, possibly of the magnitude of the Exxon Valdez. Given the importance of the park's resources, especially seabirds, sea otters, and marine mammals, that are susceptible to long-term damage from oil spills, the NPS needs to address the potential effects of oil spills in a large scale, and long-term fashion. The NPS needs to collaborate with other agencies, such as U.S. Fish & Wildlife Service, U.S. Navy, National Marine Fisheries Service, National Marine Sanctuaries Program, Minerals Management Service, U.S. Coast Guard, and California Department of Fish & Game, who have responsibility for these natural resources and have access to funds and/or expertise.

An average of 22.1 vessels per day passed through the Santa Barbara Channel in 1987, of which 84% were under foreign flag and 15% under United States flag. Twelve percent were tankers, 84% were cargo ships, and 2% were barges. At present there are 25 oil platforms and 4 marine terminals in or near the Santa Barbara Channel. These are considered hazards to navigation and potential contributors to marine emergencies.

Project statements related to this issue:

N-1-03 Desing new monitoring protocol for Western Brown Pelicans

N-1-04 Monitor marine pollutants

N-1-10 Survey aquatic ecosystem of Santa Cruz, Santa Rosa, and San Miguel Islands

N-1-28 Research seabird population dynamics

N-1-31 Monitor Santa Cruz Island Sand each communities

N-2-17 Improve the park's response capabilities to oil spills

C-12 Survey submerged cultural resources

C-16 Search for San Miguel Island wrecks

C-17 Lumber Schooner study

C-4 Survey archeology of Santa Rosa Island

Alteration of Natural Flow Regimes

Little is presently known about the quantity or quality of water resources of these islands. A water resource inventory is needed in order to develop a comprehensive Water Resources Management Plan for the park.

The islands have all been intensively grazed. The grazing has resulted in dramatic changes in the vegetation types and amounts on the islands. The change in vegetation may have altered the islands ability to capture and hold water. In several locations, streams or springs have been diverted to provide water for livestock or people.

Project statements related to this issue:

N-1-10 Survey aquatic ecosystems of Santa Cruz, Santa Rosa, and San Miguel Islands

N-1-13 Design a water resources scoping report

N-1-23 Monitor freshwater on Santa Cruz Island

N-1-24 Inventory, delineate, map, and design a monitoring program for groundwater

N-2-27 Determine Santa Cruz Island groundwater consumptive uses by native versus non-native plants

Visibility Impairment and Biological Damage Caused by Air Pollution

The park islands are part of, and impacted by, the southern California/Los Angeles airshed. Ozone levels on Anacapa Island have exceeded federal standards, 0.12 ppm, at least once. Concentrations of ozone as high as 0.20 ppm per hour have been recorded.

The Ventura County Air Quality Control Board maintained an air quality monitoring station on East Anacapa Island until 1992. They monitored ozone, sulphur dioxide, hydrocarbons, and nitrogen oxides. No information is available for other park islands. In 1994, the NPS began coordinating with the Air Pollution Control Districts for Santa Barbara and Ventura Counties. Polluted air from industrial and metropolitan sources on the mainland and offshore oil and gas facilities reduces visibility and may threaten native vegetation in the park.

The park's air quality would receive greater protection if reclassified from Class II to Class I. If the park had been in existence at the time of passage of the Clean Air Act, it would have

automatically received Class I status. In 1979, NPS requested that the State of California upgrade the park's air quality classification to Class I. The state has not responded.

At this time, the park has limited involvement in regional air quality matters. Class I status would enhance the park's role in the process of reviewing permits for significant new pollution sources and would give the NPS much greater influence over actions impacting regional air quality. Additionally, Class I status would likely increase the funding available to document and protect the park's air resources.

Project statements related to this issue:

N-1-11 Design Air Quality Monitoring Program

N-1-12 Design Air Pollution Effects Monitoring

Noise, Visual, and Biological Impacts Related to Aircraft Overflights

The issue of illegal aircraft overflights is of major importance at Channel Islands because significant impacts to natural resources are known to be occurring. Pinniped pupping and seabird nesting areas are most sensitive to disturbance from low-flying aircraft. The park does not have sufficient personnel to enforce current regulations.

Channel Islands National Marine Sanctuary (Department of Commerce) regulations prohibit aircraft overflights below 1000 feet over the waters within one nautical mile of the park islands. Low overflights can cause considerable disturbance to seals and sea lions causing stampedes which can kill young pups and cause abandonment of nesting seabirds.

Observed violations occur an average of once each week. Identification necessary for prosecution of the illegal aircraft occurs in approximately 10% of these observations. Documentation of the incidents are forwarded to NOAA General Counsel for civil prosecution. Approximately 40 hours of investigation are required for each incident before documentation is sent to NOAA.

In order to improve success in documentation and prosecution of illegal overflights, an increase in personnel and procurement of equipment for proper documentation of violations along with

amendments to NPS federal regulations are necessary.

Presently there is no funding to take action to adequately document and prosecute violations, other than one or two cases per year.

In addition, the U.S. Air Force launches Titan IV and other military space-launch vehicles from Vandenburg Air Force base, approximately 35 miles north of the islands. The flight path of the launches is generally directly over San Miguel and Santa Rosa Island and the speed is sufficient to cause sonic booms. Numerous sonic booms are expected to occur over San Miguel Island, the principal breeding area for pinnipeds in the U.S. south of Alaska. This island also supports the highest density of seabirds in southern California.

There are no project statements related to this issue.

Loss of Park Resources Due to Consumptive Practices (Recreational & Commercial Fishing)

A century of intense metropolitan development and economically driven fisheries management have dramatically damaged southern California coastal ecosystems. Nearly all historical coastal fishery stocks have collapsed in the last 40 years. Fisheries survived only by shifting to new species and moving into previously unfinished areas. Channel Islands National Park harbors the last remnants of those ecosystems and fishery stocks. The conflict between goals that seek to maximize short-term economic returns from a few species and goals that seek to conserve biological diversity and sustain long-term fishery yields from whole ecosystems has impaired efforts to restore and maintain the integrity and productivity of park ecosystems. Long-term ecological, economic, and sociological research is needed to develop management strategies that reconcile these differences and protect park resources.

Channel Islands NP was created to "conserve and protect scenic, wildlife, marine, ecological ... and scientific values of the California Channel Islands." Living marine resources in park waters are managed by the State of California to produce fishery products. The park includes about 3% of California's coastal waters (125,000 ac), yet it yields nearly 7,000 metric tonnes of

kelp, shellfish, and fish each year that constitute some 15% of California's coastal landings. This selective removal of older (larger) individuals of fishery-targeted species significantly alters their abundance and reproductive capacities. Harvest also alters ecosystem structure and function, reduces the ability of populations and communities to recover from natural and human catastrophes, and thus impairs park values. Recent collapse of abalone populations in the park dramatically demonstrated the failure of current management schemes to sustain fishery yields.

The National Park Service is working with the State and Channel Islands National Marine Sanctuary to propose and implement a new management paradigm. Evaluation of new fishery management options for coastal California requires a long-term integrated research effort. The long life-spans and late ages of maturity of many species (35-75 years and 7-10 years, respectively), the short-term dynamic nature of coastal environments driven by storms and El Niño events, and the apparent stochastic nature of larval recruitment dictate long-term study and patience.

Project statements related to this issue:

N-1-02 Explore marine environment of the Channel Islands

N-1-27 Study effects on depleted populations in marine communities

N-1-28 Research seabird population dynamics

N-1-32 Survey rare and isolated marine communities

N-1-35 Monitor marine biodiversity

N-1-36 Analysis of kelp forest dynamics

N-2-15 Restore marine ecosystem with the replenishment zones

N-2-16 Allow threatened sea otters to reinhabit the Channel Islands

N-2-20 Restore depleted abalone populations

Loss of Biological Diversity

A large portion of the resources management program at Channel Islands is focused on the maintenance of biological diversity. Knowledge of resources, through inventories, monitoring, and research, are necessary to assess what the

biological diversity of the park is. Ecosystem restoration is aimed at removal of non-native species and reintroduction or expansion of native species.

The majority of the project statements are related to the assessment, maintenance, or recovery of biological diversity.

Visitor Use Impacts on Backcountry Park Resources

Visitor use of the marine portions includes recreational activities, sport harvest, and commercial harvest. Visitor use of the park is primarily recreational. On the TNC-owned portion of Santa Cruz Island most on-island visitation is related to research and education.

Some of the park's resources, especially seabirds and pinnipeds, are highly susceptible to disturbance by humans.

The park's enabling legislation stipulates that "In recognition of the special fragility and sensitivity of the park's resources, it is the intent of congress that the visitor use within the park be limited to assure negligible adverse impact on the park resources." The park was directed to assess the suitability of the park islands for designation as wilderness. Wilderness suitability studies, which were supposed to have been done by 1983 have yet to be completed.

N-1-02 Explore marine environment of the Channel Islands

N-1-27 Study effects on depleted populations in marine communities

N-1-28 Research seabird population dynamics

N-1-32 Survey rare and isolated marine communities

N-1-35 Monitor marine biodiversity

N-1-36 Analysis of kelp forest dynamics

N-2-15 Restore marine ecosystem with the replenishment zones

N-2-16 Allow threatened sea otters to reinhabit the Channel Islands

N-2-20 Restore depleted abalone populations

C-5 Survey archeology of East Santa Cruz

C-17 Study wrecks of three lumber schooners

C-21 Design / implement a cultural resource monitoring program

Lack of Basic Data; Insufficient Understanding of Park Ecosystem and Threats to Them

Channel Islands National Park has developed a system for monitoring population dynamics of index taxa to define and evaluate ecosystem health. A Delphi technique with rating criteria was used to select potential index taxa. Nearly 500 species of the 2,000 known from the park were tested for long-term monitoring.

Inventories were conducted and protocols were developed to monitor the health of park resources. The NPS spent over \$2 million to develop model monitoring protocols at Channel Islands National Park. Monitoring has enabled park management to identify decline in abalone stocks, recovery of endangered California Brown Pelican populations, and productivity of seals and sea lions within the park. Monitoring protocols were documented in a series of published handbooks and distributed widely as a prototype program. The protocols are in great demand by other parks and land managers interested in following a similar path.

The monitoring program is based on population dynamics of selected species and is organized in twelve taxonomic or functional categories: pinnipeds, seabirds, rocky intertidal communities, kelp forest, terrestrial vertebrates, terrestrial invertebrates, land birds, terrestrial vegetation, fishery harvest, beaches and estuaries, visitors, and weather. The park is currently monitoring the following: kelp forests, seabirds, rocky intertidal, terrestrial vegetation, land birds, sandy beaches, vertebrates, and visitor numbers. The monitoring of pinnipeds is carried out by the National Marine Fisheries Service. Population parameters monitored include abundance, age structure, reproductive effort, recruitment, growth rate, mortality rate, and phenology. A local area network (LAN) of microcomputers and a geographic information system (GIS) were established to manage the monitoring data. Channel Islands received a base increase of \$320,000 and \$144,000 in FY 92 and FY 93, respectively and \$138,000 in FY 94) to expand the monitoring program to all 12 monitoring protocols.

The results of the currently implemented marine monitoring programs point to the severe degradation of entire marine communities and the collapse of populations of important species, such as abalones. Fishery harvest and other uses as well as natural events continue to affect marine resources within the park.

Monitoring protocols still need to be developed for soil and water resources. The monitoring protocols for terrestrial vertebrates, terrestrial invertebrates, visitors, and weather must be expanded to include Santa Rosa Island. All of the terrestrial monitoring protocols will need to be modified to include Santa Cruz Island.

Improved understanding of park resources will require adequate management of the considerable amounts of information that is already available, but can be difficult to locate or access. The park has collected substantial data through its monitoring program. The park library and museum collections house very useful information. The park is in the process of pulling much of the monitoring data into a GIS to make depiction and analysis of resource information more useable and pertinent. The catalogues of the library and museum collections have been computerized.

The park also relies on interaction and cooperation with other institutions, especially those specializing on the Channel Islands. The Santa Barbara Botanic Garden, Santa Barbara Museum of Natural History, U.C. Santa Cruz Island Reserve, Channel Islands National Marine Sanctuary, and others contribute greatly to increasing understanding of island systems and threats. A symposium bringing together researchers doing work on the Channel Islands is held approximately every 5 years and has occurred five times.

Project statements related to this issue:

- N-1-01 Survey Caves
- N-1-02 Explore Marine Environment of the Channel Islands
- N-1-03 Design New Monitoring Protocol for Western Brown Pelicans
- N-1-04 Monitor Marine Pollutants
- N-1-05 Assess Tsunami Danger and Flood Hazards
- N-1-06 Develop Level 1 Inventory of Geology
- N-1-07 Monitor Peregrine Falcons
- N-1-08 Monitor Listed and Rare Plants

N-1-09 Survey Soils
 N-1-10 Survey Aquatic Ecosystem of Santa Cruz, Santa Rosa, and San Miguel Islands
 N-1-11 Design Air Quality Monitoring
 N-1-12 Design Air Pollution Effects Monitoring
 N-1-13 Design a Water Resources Scoping Report
 N-1-14 Monitor Seabirds at all Islands
 N-1-15 Study Ecology and Spotted Skunks on Santa Rosa Island
 N-1-16 Establish and Maintain Long Term Meteorological Monitoring
 N-1-17 Monitor Land Birds on all Park Islands
 N-1-18 Study Species of Special Concern on Santa Cruz Island
 I N-1-19 Investigate Population Dynamics and Habitat Relationships of Endemic Land Birds
 N-1-20 Design and Implement Vertebrate Monitoring Protocols for Santa Rosa and Santa Cruz Islands
 N-1-21 Develop an Air Quality Monitoring Program on Santa Cruz Island
 N-1-22 Monitor Weather on Santa Cruz Island
 N-1-23 Monitoring Program for Freshwater on Santa Cruz Island
 N-1-24 Inventory, Delineate, Map, and Design a Monitoring Program for Groundwater
 N-1-25 Assess Black Sea Bass populations
 N-1-26 Discover and Map Deep Sea Habitat and Species Distribution
 N-1-27 Study effects on Depleted Populations in Marine Communities
 N-1-28 Research Seabird Population Dynamics
 N-1-29 Determine Insular Status of American Ketrrels on Santa Cruz Island
 N-1-30 Study Bats on Santa Cruz Island
 N-1-31 Monitor Santa Cruz Island Sand Beach Communities
 N-1-32 Survey Rare and Isolated Marine Communities
 N-1-33 Monitor Pathogens in Sea Water
 N-1-34 Investigate Population Dynamics and Habitat Relationships of Endemic Land Birds
 N-1-35 Monitor Marine Biodiversity
 N-1-36 Analysis of Kelp Forest Dynamics
 N-1-37 Monitor Kelp Canopy around the Channel Islands
 N-1-38 Inventory Terrestrial Invertebrates on Santa Cruz Island and Review Monitoring Protocols
 N-1-39 Develop Integrated Terrestrial Monitoring Program for Santa Cruz Island
 N-1-40 Study Dynamics of Deer Mice and Hantra Virus

Loss of Fragile and Irreplaceable Cave Resources

The Park contains over 354 caves, with a cumulative passage length exceeding nine miles. A cave inventory has been essentially completed on Santa Cruz Island and Anacapa Island, is underway on Santa Rosa Island, and has barely begun on Santa Barbara Island and San Miguel Island. A substantial number of these are sea caves, but many are terrestrial rock shelters which are "caves" for the purposes of the Cave Resources Protection Act. Projecting from known resources, the park may contain as many as twenty miles of passage and perhaps 1000 caves. Painted Cave, on Santa Cruz Island, is currently the longest recorded sea cave in the world.

While many caves have been located and mapped, authoritative survey for resources has not occurred in many caves. Our present understanding is that many sea caves harbor cultural resources, both archeological and historical; serve as resting and haulout locations for pinnipeds; contain a number of geological phenomena, paleontological specimens, and speleothems (cave formations), some of which are quite rare; provide recreation and scenic beauty for kayakers and other small boats; and possibly host small populations of poorly understood invertebrates. Terrestrial rock shelters may serve as roosts for local bat populations. Most particularly, sea caves serve as nesting localities for several species of seabirds.

A one-time survey of seabird colonies in Southern California, including sea caves in the Park, indicated that sea caves were being used by seabirds more extensively than had been previously thought. However, no quantitative data on nesting effort, nesting success, or visitor impacts was obtained.

In FY91 we became aware that visitation to sea caves by kayakers was increasing; the park developed a bulletin to assist in educating kayaking groups regarding the locations of some sea caves known to be used by seabirds or pinnipeds, and critical times of year to avoid visiting these areas. There are no formal regulations or enforcement procedures concerning these suggested visitation schedules. The park, with support from endangered species mitigation monies from a company operating at Vandenburg Air Force base, produced a video on

the impacts of disturbance on seabirds and pinnipeds. Over 200 videos have been distributed to tour boats, dive boats, kayak groups, school groups, and other agencies.

Sea caves are the sole source of suitable breeding habitat for several seabird species that nest in the park each year. Repeated disturbances to nest sites by unwitting visitors will cause nesting failures in some species. Of particular concern is the increasing numbers of sea kayakers in the park, a fact that could have detrimental impacts to sensitive cave resources due to the kayak's unprecedented maneuverability and the kayakers' love of sea caves.

Without more scientific knowledge about sea cave resources, kayaker visitation rates, and the interaction between resources and people, we cannot make informed management decisions. We need to be able to predict the consequences of increased visitation before negative impacts to resources occur.

Project statements related to this issue:

N-1-01 Survey Caves

N-1-14 Monitor seabirds at all islands